

Biographical Summary

Jiamin Wan's research focuses on experimental investigations of coupled geochemical reactions and transport in multi-phase subsurface systems, particularly those involving interfacial phenomena. Her research accomplishments include: (a) revealing preferential sorption of colloids onto subsurface fluid-fluid interfaces, and its impact on contaminant fate and transport; (b) developing and testing the film straining model for colloid transport in unsaturated porous media; (c) revealing pH zonation and reaction fronts in waste plumes and their strong impact on contaminant fate and transport in vadose zone plumes; (d) identifying mechanisms responsible for uranium migration through the deep vadose zone to the groundwater; and (e) discovering that bioreduced U(IV) can be re-oxidized under sustained reducing conditions.

Research Interests

- Colloid and surface chemistry: Fate and transport of natural colloids and engineered nanoparticles in subsurface environments.
- Contaminant geochemistry: Biogeochemical reactions and transport of radionuclides and contaminant metals in the subsurface.
- High pressure-temperature multi-fluid systems: Geochemical processes and mechanisms controlling CO₂ behavior in deep reservoirs.

Education

Ph.D., Hydrology, 1993, New Mexico Institute of Mining and Technology, NM, USA.
M.S., Geochemistry, 1984, Institute of Geochemistry, Chinese Academy of Sciences, China.
B.S., Chemistry, 1981, Beijing University of Iron and Steel Technology, China.

Professional Experience

1997- present: Staff scientist, Earth Science Division, LBNL.
1995 -1997: Scientist, Earth Science Division, LBNL.
1993 -1995: Post-doctoral research fellow, Earth Science Division, LBNL.
1984 -1986: Scientist, Institute of Geochemistry, Chinese Academy of Sciences, in China.

Funding awards through peer reviewed proposals, as the lead PI

- 1995-1997, DOE – BES: Colloid transport in unsaturated porous media
- 1998-2000, DOE – BES: Unsaturated flow and colloid transport
- 2001-2003, DOE – BES: Colloids at fluid-fluid interfaces
- 2004-2006, DOE – BES: Nanoparticles fate and transport in the subsurface
- 1997-1999, DOE – EMSP: Sorption of organics and metals onto gas-water interfaces
- 2001-2003, DOE – EMSP: Evolution of alkaline-saline waste plumes in the Hanford site
- 2004-2006, DOE – EMSP: Reactive transport of U in waste plumes in Hanford Site
- 2007-2009, DOE – ERSP: Hydrological and geochemical studies on Hanford Site U plumes
- 1999-2001, DOE – NABIR: Mesoscale biotransformation dynamics of Cr and U
- 2002-2004, DOE – NABIR: Coupled transport and bioreduction of U(VI) in sediments

- 2008-2010, DOE – BER: Environmental impacts of engineered nanoparticulates

Refereed Journals (No changes)

Wan, J., Y. Kim, T.K. Tokunaga, Z. Wang, S. Dixit, C.I. Steefel, E. Saiz, M. Kunz, and N. Tamura. Spatially resolved U(VI) partitioning and speciation: Implications for plume scale behavior of contaminant U in the Hanford vadose zone. *Environ. Sci. Technol.* 43, 2247-2253, 2009.

Tokunaga, T.K., Y. Kim, and J. Wan. Potential remediation approach for uranium-contaminated groundwaters through potassium uranyl vanadate precipitation. *Environ. Sci. Technol.*, 43, 5467-5471, 2009.

Wan, J., T.K. Tokunaga, Y. Kim, E. Brodie, R. Daly, T.C. Hazen, and M.K. Firestone. Effects of organic carbon supply rates on uranium mobility in a previously bioreduced contaminated sediment. *Environ. Sci. Technol.* 42, 7573-7579, 2008.

Tokunaga, T.K., Wan, J., Kim, Y., R.A. Daly, E.L. Brodie, T.C. Hazen, D. Herman, and M.K. Firestone. Influences of organic carbon supply rate on uranium reduction in initially oxidizing, contaminated sediment. *Environ. Sci. Technol.* 42, 8901-8907, 2008.

Wan, J., T.K. Tokunaga, Y. Kim, Z. Wang, A. Lanzirotti, E. Saiz, and R.J. Serne, Effect of saline waste solution infiltration rates on uranium retention and spatial distribution in Hanford sediments, *Environ. Sci. Technol.*, 42, 1973-1978, 2008.

Tokunaga, T.K., J. Wan, Y. Kim, S.R. Sutton, M. Newville, A. Lanzirotti, and W. Rao. Real-time X-ray absorption spectroscopy of uranium, iron, and manganese in contaminated sediments during bioreduction. *Environ. Sci. Technol.*, 42, 2839-2844, 2008.

Zheng, Z., G. Zhang, J. Wan, Reactive transport modeling of column experiments on

the evolution of saline-alkaline waste solutions, *Journal of Contaminant Hydrology*, 97, 42-54, 2008.

He, Y.T., J. Wan, and T.K. Tokunaga, Kinetic stability of hematite nanoparticles: the effect of particle sizes, *J. Nanopart. Res.*, 10:321-332, 2008.

Wan, J., T. Tyliszczak, and T.K. Tokunaga, Organic carbon distribution, speciation, and elemental correlations within soil microaggregates: Applications of STXM microscopy and NEXAFS spectroscopy, *Geochim. Cosmochim. Acta*, 71, 5439-5449, 2007.

McKinley, J.P., J.M. Zachara, J. Wan, D.E. McCready, and S.M. Heald, Geochemical controls on contaminant uranium in vadose Hanford formation sediments at the 200 Area and 300 Area, Hanford Site, Washington, *Vadose Zone J.* 6:1004–1017. 2007.

Tokunaga, T.K., J. Wan, A. Lanzirotti, S.R. Sutton, and M. Newville, Long-term stability of organic carbon-stimulated chromate reduction in contaminated soils, and its relation to manganese redox status, *Environ. Sci. Technol.*, 41 (12) 4326-4331, 2007.

Colloids Surfaces A. Phys. Eng. Aspects, 274, 48-55, 2006.

Brodie, E.L., T.Z. DeSantis, D.C. Joyner, S. Baek, J.T. Larsen, G.L. Andersen, T.C. Hazen, D.J. Herman, T.K. Tokunaga, J. Wan, and M.K. Firestone, Application of a high-density oligonucleotide microarray approach to study bacterial population dynamics during uranium reduction and reoxidation. *Appl. Environ. Microbiol.* 72:6288-6298, 2006.

Wan, J., T.K. Tokunaga, E. Brodie, Z. Wang, Z. Zheng, T.C. Hazen, M.K. Firestone, S.R. Sutton, Reoxidation of bioreduced U under reducing conditions. *Environ. Sci. Technol.*, 39, 6162-6169, 2005.

Tokunaga, T. K., J. Wan, J. Pena, E. Brodie, M.K. Firestone, and T.C. Hazen, Uranium reduction in sediments under diffusion-limited transport of organic

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- Wan, J. and T.K. Tokunaga, Vadose Zone J., 4, 954-956, 2005.
- Zhang, G., Z. Zheng, J. Wan, Modeling reactive geochemical transport of concentrated aqueous solutions in variably saturated media. Water Resour. Res., 41, W02018, doi: 10.1029/ 2004 WR003097, 2005.
- Tokunaga, T.K., J. Wan, J. Pena, S.R. Sutton, and M. Newville. Hexavalent uranium diffusion in soils from concentrated acidic and alkaline solutions. Environ. Sci. Technol. 38, 3056-3062, 2004.
- Wan, J., T.K. Tokunaga, E. Saiz, J.T. Larsen, Z. Zheng, and R.A. Couture, 6066-6073, 2004.
- Wan, J., J.T. Larsen, T.K. Tokunaga, Z. Zheng, pH neutralization and zonation in alkaline-saline tank waste plumes. Environ. Sci. Technol. 38, 1321-1329, 2004.
- Wan, J., T.K. Tokunaga, J.T. Larsen, and R.J. Serne, Geochim. Cosmochim. Acta. 68, 491-502, 2004.
- Tokunaga, T.K., K.R. Olson, and J. Wan. Conditions necessary for capillary hysteresis in porous media: Tests of grain-size and surface tension influences. Water Resour. Res. 40, W05111, 2004.
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- Tokunaga, T.K., J. Wan, M.K. Firestone, T.C. Hazen, K.R. Olson, D.J. Herman, S.R. Sutton, and A. Lanzirotti. In-situ reduction of Cr(VI) in heavily contaminated soils through organic carbon amendment. J. Environ. Qual. 32, 1641-1649, 2003.

- Wan, J., T.K. Tokunaga, Partitioning of clay colloids at air-water interfaces, *J. Colloid Interface Sci.* 247, 54-61, 2002.
- Wan, J., S. Veerapaneni, F. Gadelle, and T.K. Tokunaga, Generation of stable micro-bubbles and their transport through porous media, *Water Resour. Res.*, 37, 1173-1182, 2001.
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Wan, J., J.L. Wilson, and T. Kieft, The effects of the gas-water interface on transport of microorganisms in unsaturated porous media, *Appl. Environ. Microbiol.*, 60, 509 1994.

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